



N 沟道增强型场效应晶体管

N-CHANNEL MOSFET

FHN70N04LA

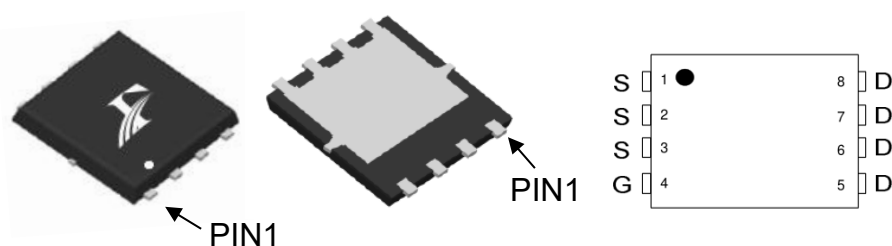
主要参数 MAIN CHARACTERISTICS

ID	65A
VDSS	40 V
Rdson-typ (@Vgs=10V)	6.2 mΩ
Rdson-typ (@Vgs=4.5V)	7.2 mΩ
Qg-typ	56.5nC

用途 APPLICATIONS

开关电源	Switching Power Supply
电机驱动	Motor Drive
同步整流	Synchronus Rectification

封装形式 Package

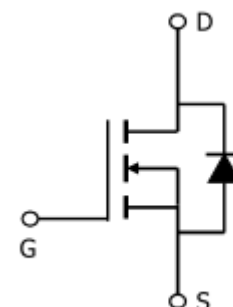


PDFN5X6-8
FHN series

产品特性 FEATURES

低栅极电荷	Low gate charge
低 Crss (典型值 195pF)	Low Crss (typical195pF)
开关速度快	Fast switching
100%经过雪崩测试	100% avalanche tested
100%经过热阻测试	100% DVDS tested
100%经过 UIS 测试	100% UIS Tested
100%经过 RG 测试	100% Rg tested
RoHS 产品	RoHS product
Trench 工艺	Trench process

等效电路 Equivalent Circuit



绝对最大额定值 ABSOLUTE RATINGS (Tc=25°C)

项目 Parameter	符号 Symbol	数值 Value	单位 Unit
		FHN70N04LA	
最高漏极-源极直流电压 Drain-Source Voltage	V _{DS}	40	V
连续漏极电流* Drain Current -continuous *	I _D (T _C =25°C)	65	A
	I _D (T _C =100°C)	40	A
最大脉冲漏极电流 (注 1) Drain Current – pulse (note 1)	I _{DM}	260	A
最高栅源电压 Gate-Source Voltage	V _{GS}	±20	V
单脉冲雪崩能量 (注 2) Single Pulsed Avalanche Energy (note 2)	E _{AS}	30.25	mJ
雪崩电流 (注 1) Avalanche Current (note 1)	I _{AR}	11	A
重复雪崩能量 (注 1) Repetitive Avalanche Current (note 1)	E _{AR}	9	mJ
二极管反向恢复最大电压变化速率 (注 3) Peak Diode Recovery dv/dt (note 3)	dv/dt	5.0	V/ns
耗散功率 Power Dissipation	P _D (T _C =25°C)	48	W
	-Derate above 25°C	0.38	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	T _J , T _{STG}	-55~+150	°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	260	°C

*漏极电流由最高结温限制

*Drain current limited by maximum junction temperature

电特性 ELECTRICAL CHARACTERISTICS

项目 Parameter	符号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 Off –Characteristics						
漏-源击穿电压 Drain-Source Voltage	BVDSS	ID=250μA, VGS=0V	40	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	ΔBVDSS/ΔTJ	ID=250μA, referenced to 25°C	-	0.04	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	IDSS	VDS=40V, VGS=0V, Tc=25°C	-	-	1	μA
		VDS=32V, Tc=125°C	-	-	100	μA
栅极体漏电流 Gate-body leakage current	IGSS (F/R)	VDS=0V, VGS =±20V	-	-	±100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	VGS(th)	VDS = VGS , ID=250μA	1.0	1.6	2.5	V
静态导通电阻 Static Drain-Source On-Resistance	RDS(ON)	VGS =10V , ID=20A	-	6.2	7.5	mΩ
		VGS =4.5V , ID=20A	-	7.2	9.0	mΩ
正向跨导 Forward Transconductance	gfs	VDS = 5V, ID=20A (note 4)	-	58	-	S
动态特性 Dynamic Characteristics						
栅电阻 Gate Resistance	Rg	f=1.0MHz, VDS=OPEN	-	2.0	-	Ω
输入电容 Input capacitance	Ciss	VDS=25V, VGS =0V, f=1.0MHz	-	2391	-	pF
输出电容 Output capacitance	Coss		-	359	-	
反向传输电容 Reverse transfer capacitance	Crss		-	195	-	
开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	td(on)	VDD=20V, ID=20A, RG=3.3Ω VGS =10V (note 4, 5)	-	13	-	ns
上升时间 Turn-On rise time	tr		-	11	-	ns
延迟时间 Turn-Off delay time	td(off)		-	41	-	ns
下降时间 Turn-Off Fall time	tf		-	14	-	ns
栅极电荷总量 Total Gate Charge	Qg	VDS =32V , ID=20A , VGS =10V (note 4, 5)	-	56.5	-	nC
栅-源电荷 Gate-Source charge	Qgs		-	5.1	-	nC
栅-漏电荷 Gate-Drain charge	Qgd		-	18.5	-	nC
漏-源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings						
正向最大连续电流 Maximum Continuous Drain - Source Diode Forward Current		IS	-	-	65	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		ISM	-	-	260	A
正向压降 Drain-Source Diode Forward Voltage	VSD	VGS=0V, IS=20A	-	0.85	1.2	V
反向恢复时间 Reverse recovery time	trr	VGS=0V, IS=20A, dIF/dt=100A/μs (note 4)	-	23	-	ns
反向恢复电荷 Reverse recovery charge	Qrr		-	58	-	nC

热特性 THERMAL CHARACTERISTIC

项目 Parameter	符号 Symbol	FHN70N04LA	单位 Unit
结到管壳的热阻 Thermal Resistance, Junction to Case	Rth(j-c)	2.6	°C/W
结到环境的热阻 Thermal Resistance, Junction to Ambient	Rth(j-A)	50	°C/W

注释:

- 1: 脉冲宽度由最高结温限制
- 2: L=0.5mH, V_G=10V, V_{DD}=25V, R_G=25 Ω, 起始结温 T_J=25°C
- 3: I_{SD} ≤65A, di/dt ≤300A/μs, V_{DD}≤B_VD_{SS}, 起始结温 T_J=25°C
- 4: 脉冲测试: 脉冲宽度 ≤300μs, 占空比≤2%
- 5: 基本与工作温度无关

Notes:

- 1: Pulse width limited by maximum junction temperature
- 2: L=0.5mH, V_G=10V, V_{DD}=25V, R_G=25 Ω, Starting T_J=25°C
- 3: I_{SD} ≤65A, di/dt ≤300A/μs, V_{DD}≤B_VD_{SS}, Starting T_J=25°C
- 4: Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%
- 5: Essentially independent of operating temperature

Typical Operating Characteristics

Figure 1: Power Dissipation

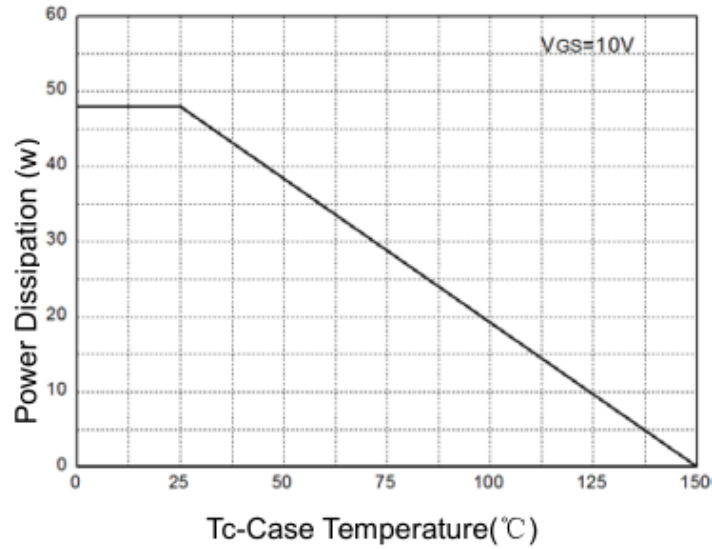


Figure 2: Drain Current

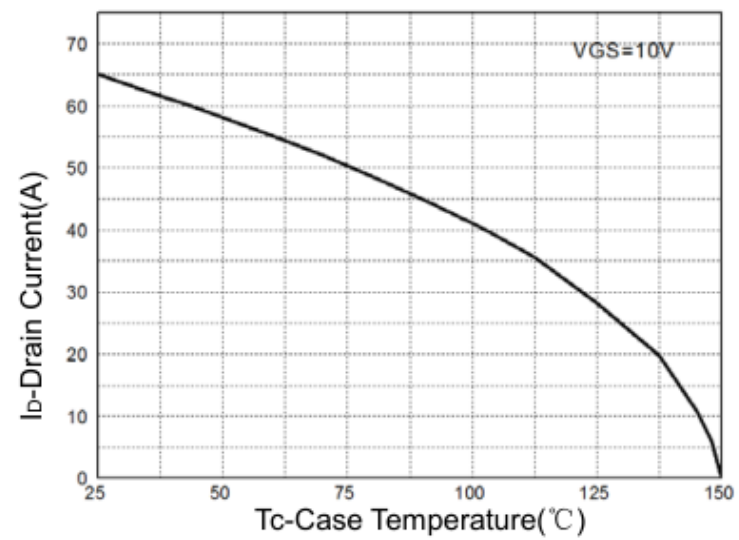


Figure 3: Safe Operation Area

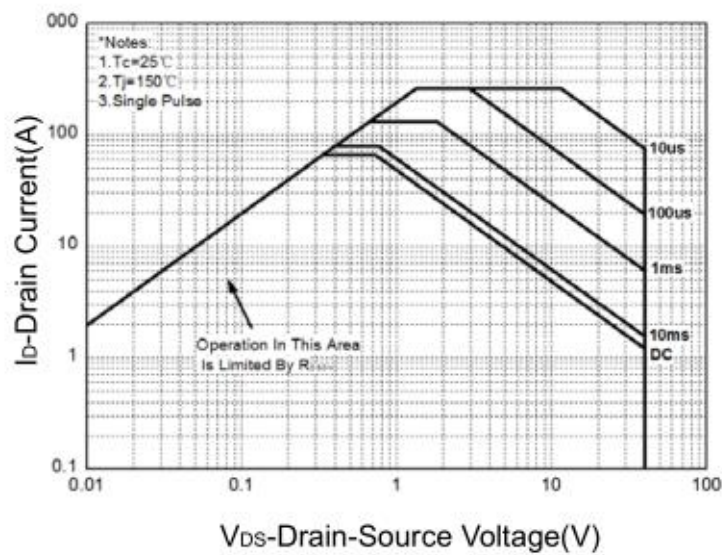


Figure 4: Thermal Transient Impedance

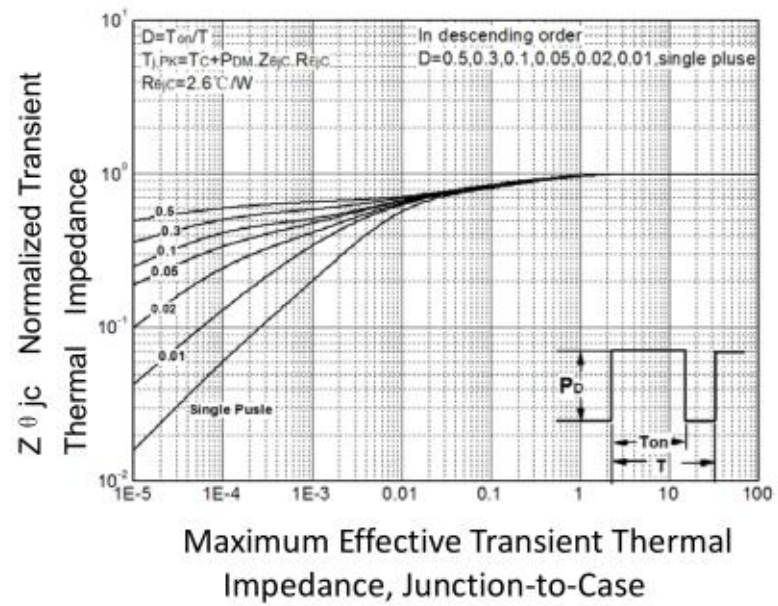


Figure 5: Output Characteristics

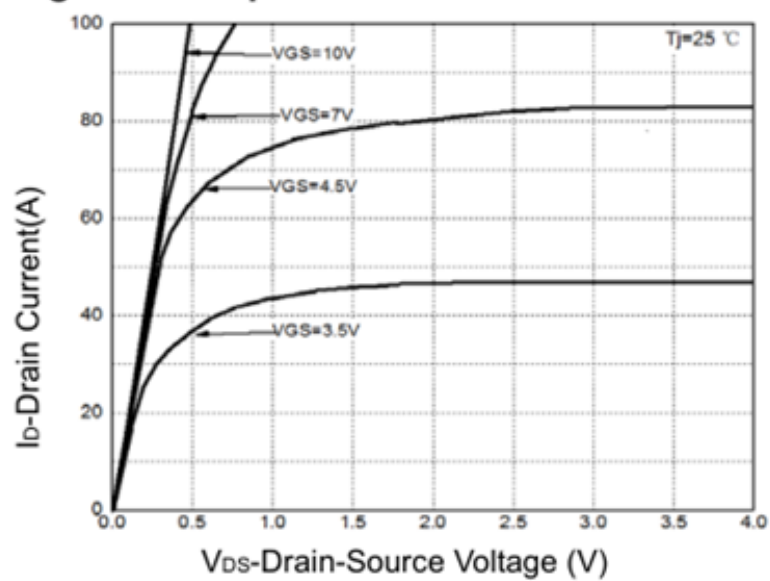


Figure 6: Drain-Source On Resistance

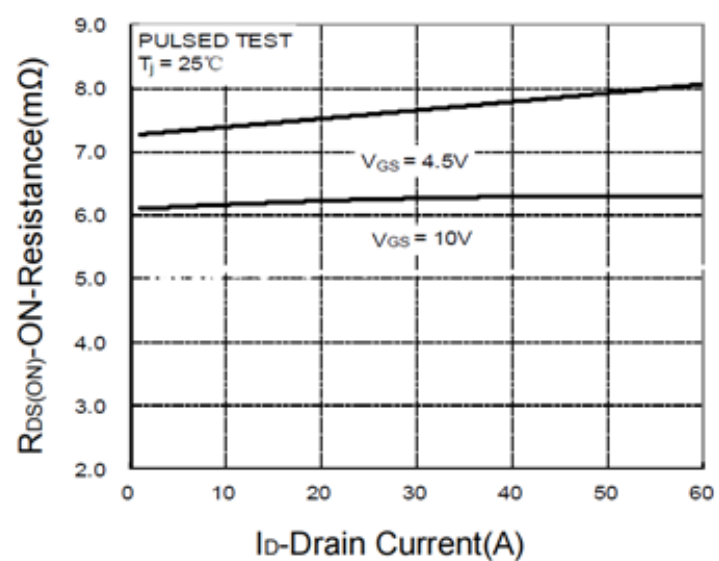


Figure 7: On-Resistance vs. Temperature

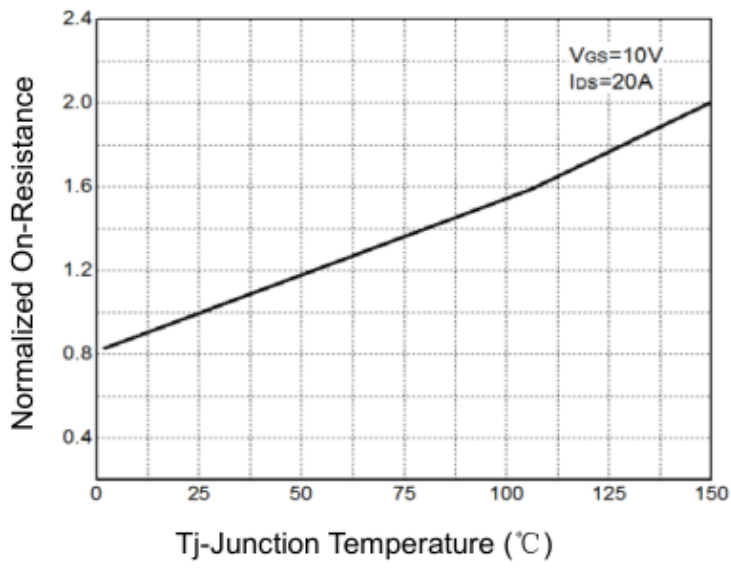


Figure 8: Source-Drain Diode Forward

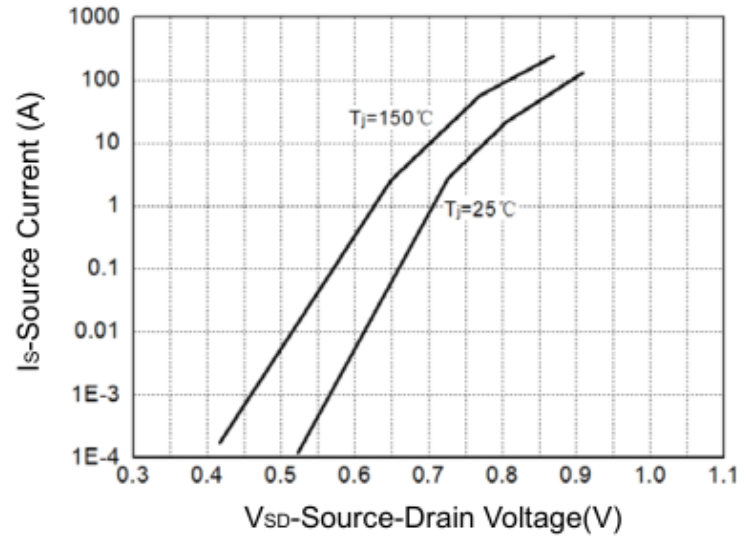


Figure 9: Capacitance Characteristics

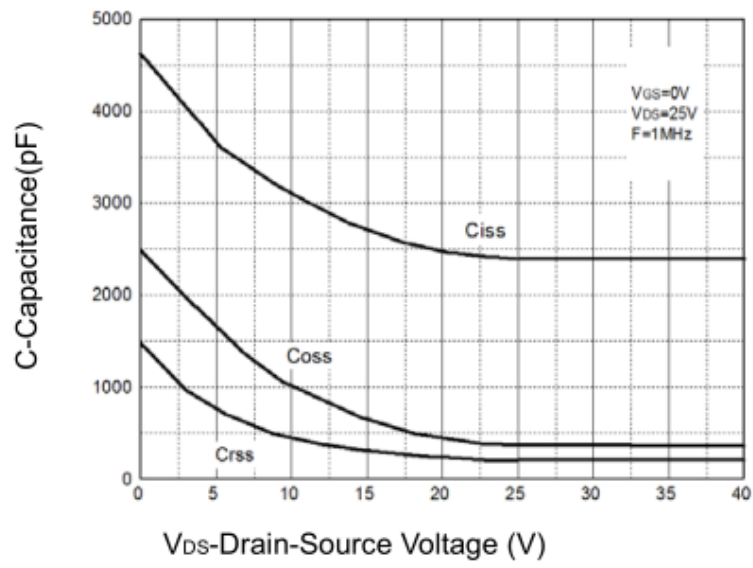
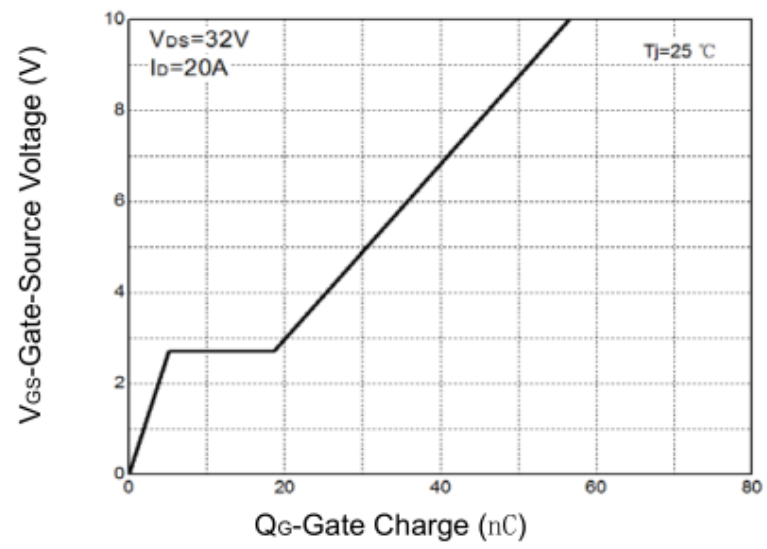
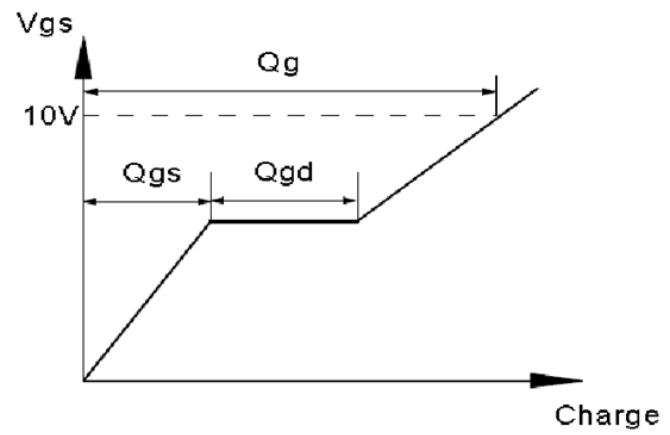
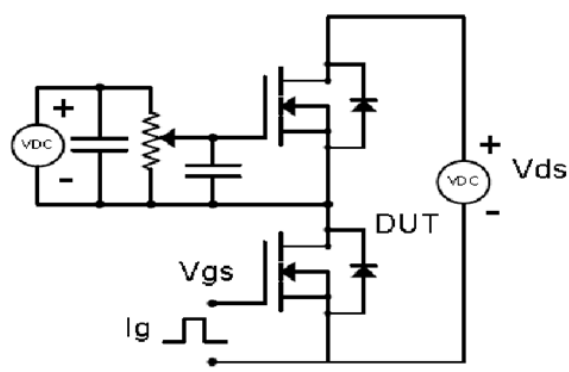


Figure 10: Gate Charge Characteristics

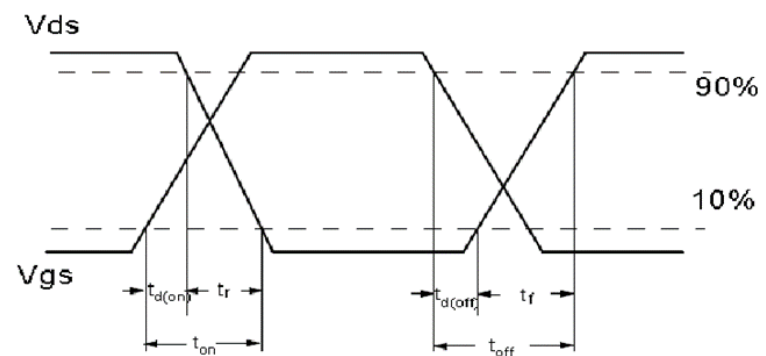
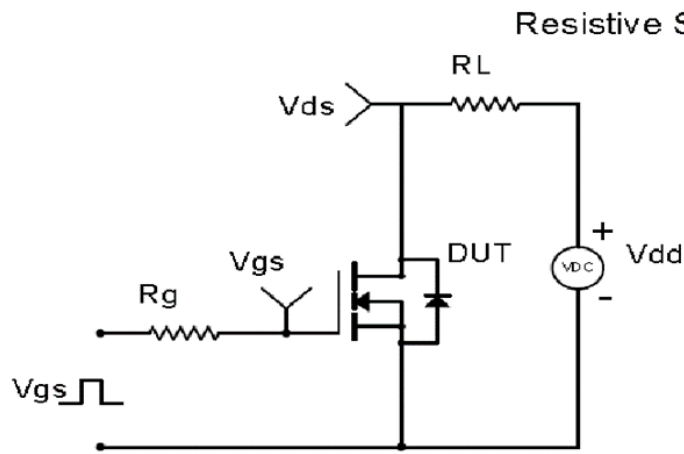


Test Circuit & Waveform

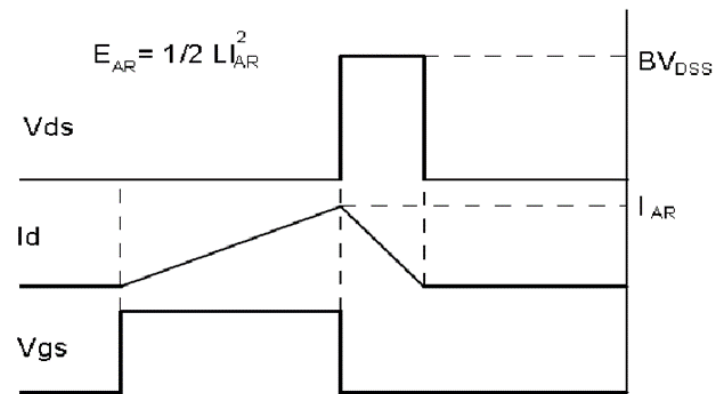
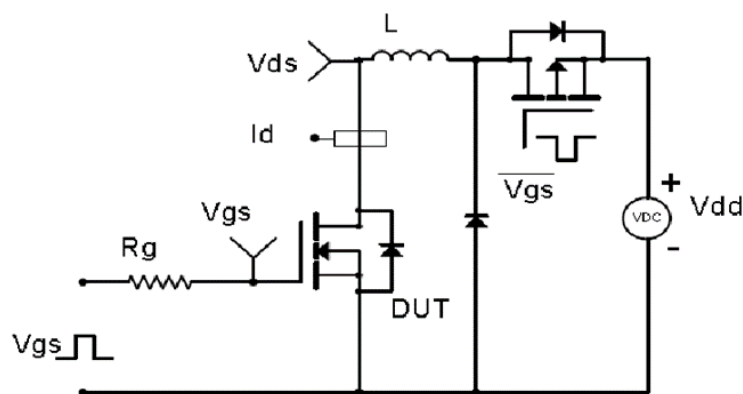
Gate Charge Test Circuit & Waveform



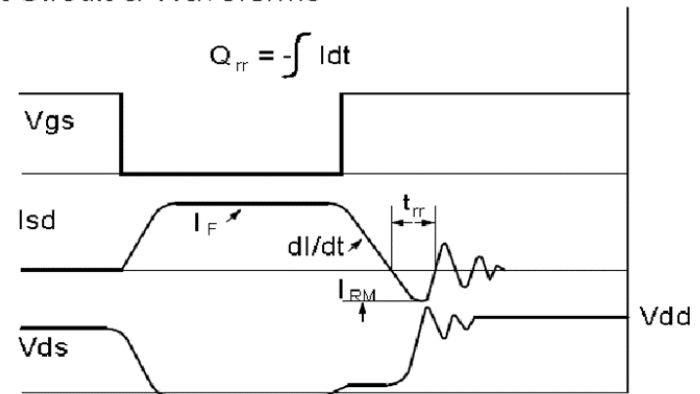
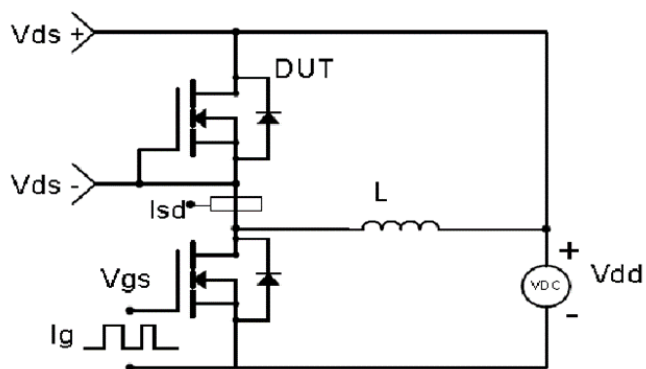
Resistive Switching Test Circuit & Waveforms



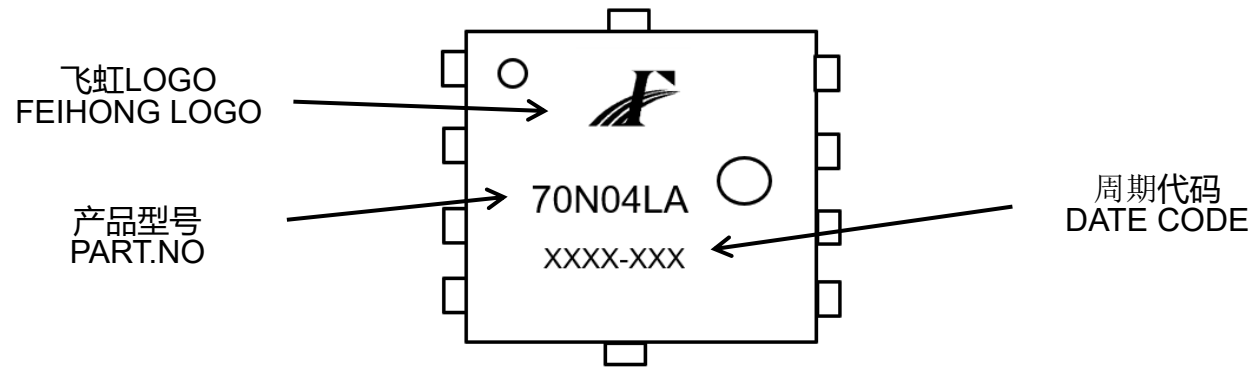
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



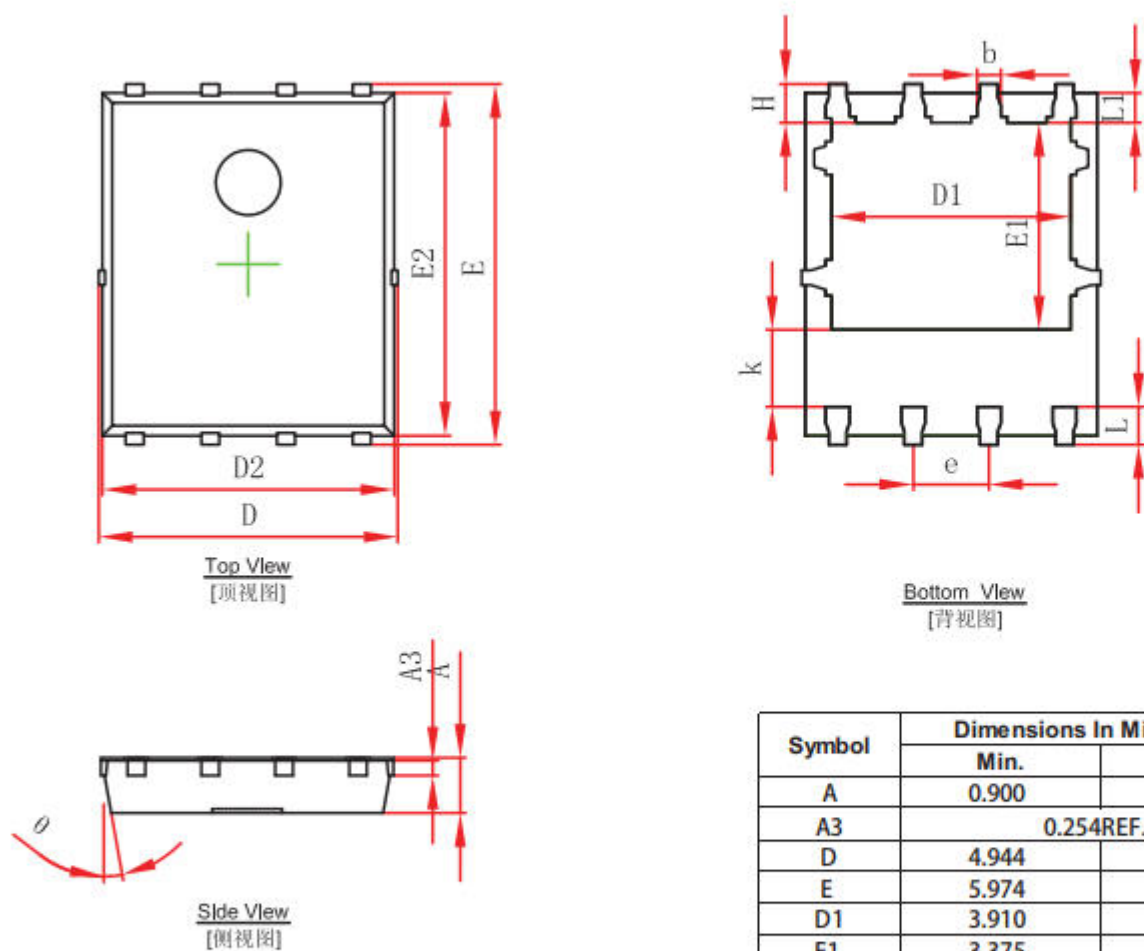
印记 Marking:



外形尺寸:

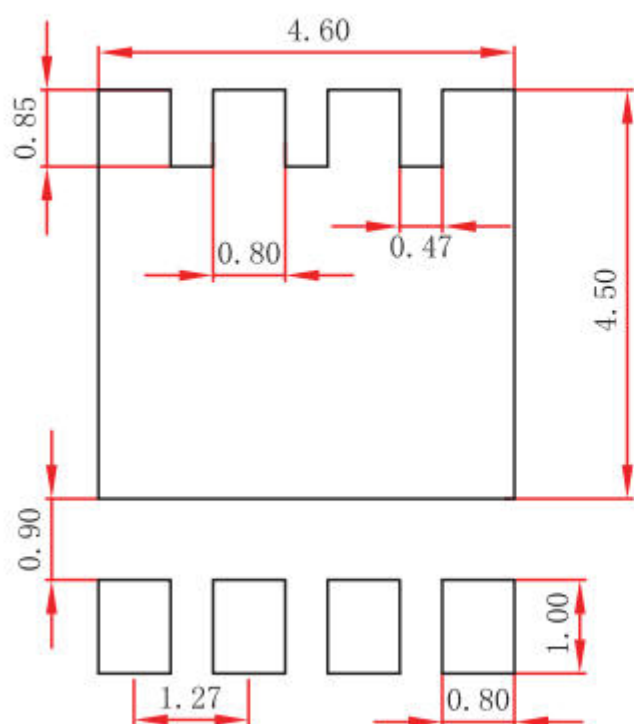
PDNF5X6-8

Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: ± 0.05 mm.
3. The pad layout is for reference purposes only.